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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/053,085	11/09/2001	Raymond J. Gorte	PENN.N2437 C	5527
21967	7590	12/19/2005	EXAMINER	
HUNTON & WILLIAMS LLP INTELLECTUAL PROPERTY DEPARTMENT 1900 K STREET, N.W. SUITE 1200 WASHINGTON, DC 20006-1109			YUAN, DAH WEI D	
			ART UNIT	PAPER NUMBER
			1745	
DATE MAILED: 12/19/2005				

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/053,085

Applicant(s)

GORTE ET AL.

Examiner

Dah-Wei D. Yuan

Art Unit

1745

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 September 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-30 and 54 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-30 and 54 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 09 November 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 04282005.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

Art Unit: 1745

**THE USE OF SULFUR-CONTAINING FUELS FOR
DIRECT OXIDATION FUEL CELLS**

Examiner: Yuan

S.N. 10/053,085

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December 5, 2005

Detailed Action

1. The Applicant's amendment filed on September 23, 2005 was received. Claims 1,20,54 were amended.
2. The text of those sections of Title 35, U.S.C. code not included in this action can be found in the prior Office Action issued on April 26, 2005.

Specification

3. As stated in the previous Office Action, the abstract of the disclosure is objected to because of undue length. The abstract needs to be less than 150 words. Correction is required. See MPEP § 608.01(b).

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1,15,18,20,30,54 are rejected under 35 U.S.C. 102(b) as being anticipated by Mogensen et al. (US 5,350,641).

With respect to claims 1,20,30,54, Mogensen et al. teach a solid oxide fuel cell comprising an electrolyte of yttria stabilized-zirconia (YSZ), a ceramic metal composite anode comprising ceria and a cathode. The composite anode further comprises auxiliary oxides, such as NiO or CuO, which prevents ceria from diffusion into YSZ and help adhere the two materials into one another (serving as a fused layer between the ceria and the YSZ). Upon further treatment, the resulting solid fuel cell can become tolerant to a fuel gas that has a sulphur content of about 100 ppm. A process of producing electrical energy using such solid oxide fuel cell is also taught. See Column 2, Lines 14-52; Column 3, Lines 9-17.

With respect to claims 15,18, Mogensen discloses the electrolyte is a ceramic oxygen ion conductor of yttria-stabilize zirconia. See Column 2, Lines 14-52.

Claim Rejections - 35 USC § 103

6. The claim rejections under 35 U.S.C. 103(a) as unpatentable over Gorte et al. (US 6,589,680) in view of Annumakonda et al. (US 6,221,280 B1) on claims 1-6,9-27,30,54 are withdrawn, because independent claims 1,20,54 have been amended.

7. The claim rejections under 35 U.S.C. 103(a) as unpatentable over Cable et al. (US 5,589,285) in view of Annumakonda et al. (US 6,221,280 B1) on claims 1-6,9-19,54 are withdrawn, because independent claims 1,20,54 have been amended.

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8. Claims 2-6,9-14,21-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mogensen et al. (US 5,350,641) as applied to claims 1,15,18,20,30,54 above, and further in view of Annumakonda et al. (US 6,221,280 B1).

With respect to claims 2-6,9,21-27, Mogensen et al. disclose a solid oxide fuel cell as described above in Paragraph 5. However, Mogensen et al. do not teach or suggest the use of other sulphur-containing fuels. Anumakonda et al. teach the use of sulfur-containing heavy hydrocarbon fuels for a solid oxide fuel cell. The hydrocarbon fuel is a liquid hydrocarbon having at least six carbon atoms and a sulfur content of at least 50 ppm. In one embodiment, the JP-8 fuel has a sulfur content of about 3000 ppm. The feed, containing the vaporized fuel and oxygen, is partially oxidized by a catalytic reaction to convert the hydrocarbon to hydrogen and carbon monoxide. As a result, the use of catalytic partial oxidation process to produce fuel enables a simplified overall system design. Furthermore, the product gas can be used as a fuel for a fuel cell system, either directly or after treatment for desulfurization. Anumakonda et al. further teach the conversion of refinery liquid hydrocarbon fuels, such as gasoline and naphtha, to hydrogen/carbon monoxide gas streams by partial oxidation process. The hydrocarbon fuels further comprises fuels, such as JP-4 jet fuel, JP-5 jet fuel, JP-8 jet fuel, No. 2 fuel oil, diesel oil, kerosene, and decane. See Abstract, Column 1, Lines 11-15; Column 4, Lines 7-9,35-39, Column 8, Lines 36-42; Column 11, Lines 58-62. Therefore, it would have been obvious to one of ordinary skill in the art to use a fuel having sulfur content of at least 50 ppm to about 3000 ppm on the solid oxide fuel cell of Mogensen, because Anumakonda et al. teach the processing

and use of a sulfur-containing hydrocarbon fuel to simplify the overall design of a solid oxide fuel cell system.

With respect to claims 10-14, Anumakonda et al. teach the military specification for maximum sulfur content in logistic fuels, such as Jet A, JP-4, JP-5, and JP-8, is 0.3 wt% (3000 ppm). Typically, however, commercially available jet fuels have a total sulfur content of about 0.05-0.07 wt.% (500-700 ppm). See Column 2, Lines 38-44. Therefore, it would have been obvious to one of ordinary skill in the art to use a fuel having sulfur content of at about 500 to about 700 ppm on the solid oxide fuel cell of Mogensen, because Anumakonda et al. teach the processing and use of a sulfur-containing hydrocarbon fuel, such as JP-4, JP-5, and JP-8, can simplify the overall design of a fuel cell system.

9. Claims 16,17,19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mogensen et al. (US 5,350,641) as applied to claims 1,15,18,20,30,54 above.

With respect to claims 16,17,19, it is well known in the art that ionically conductive materials, such as yttria-stabilized zirconia, scandium-doped zirconia, gadolinium-doped ceria, and rare earth or alkaline earth-doped LaAGaO_3 , are functionally equivalent solid electrolyte as evidenced by Wallin et al. (US 6,017,647); Column 4, Lines 49-59. Therefore, it would have been obvious to one of ordinary skill in the art to substitute gadolinium-doped ceria (scandium-doped zirconia) for the yttria-stabilized zirconia in the solid oxide fuel cell disclosed by Mogensen.

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10. Claims 7,8,28,29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mogensen et al. (US 5,350,641) and Annumakonda et al. (US 6,221,280 B1) as applied to claims 1-6,9-27,30,54 above.

It is well known in the fuel cell art that methane (CH₄) and alcohols, such as methanol and ethanol, are functionally equivalent hydrocarbon fuels. Therefore, it would have been obvious to one of ordinary skill in the art to substitute methanol for the methane as the fuel in the operation of the solid oxide fuel cell disclosed by Mogensen.

Conclusion

11. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.


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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dah-Wei D. Yuan whose telephone number is (571) 272-1295. The examiner can normally be reached on Monday-Friday (8:00-5:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick J. Ryan, can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Dah-Wei D. Yuan
December 5, 2005



DAH-WEI YUAN
PRIMARY EXAMINER